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NOTICES FROM THE LICK OBSERVATORY.*

PREPARED BY MEMBERS OF THE STAFF.

STARS WITH VARIABLE VELOCITIES IN THE LINE OF SIGHT.

The eight stars following should be added to the seven previously announced by me in these *Publications* as having variable velocities in the line of sight.

ϵ *Libræ*.

The variable velocity of this star, detected several months ago, is indicated by the following results:—

1899, April	13	—	8 km.
May	10	+	12.2
	15	+	7.5
June	12	—	7.5
	14	—	7.0
	26	—	11.2
July	13	—	10.8

The period is undetermined, but it seems to exceed three months.

h *Draconis*.

The velocities obtained for this star are:—

1899, June	26	—	26 ^{km.}
July	11	—	36
	16	—	32
	24	—	16

The period remains undetermined.

λ *Andromedæ*.

The velocities obtained up to date are:—

1897, Nov.	16	+	16 ^{km.}
1898, Oct.	18	—	2
	26	+	13
1899, July	5	+	15
	11	+	3
	12	+	2
	16	+	1
	24	+	14

* Lick Astronomical Department of the University of California.

These observations are apparently satisfied by a period of about twenty days.

ε Ursæ Minoris.

The velocities observed for this star are as below:—

1897, May	5	+	3 ^{km.}
	27	—	35
July	21	—	10
Aug.	4	+	9
1899, July	31	—	40

The period remains undetermined.

ω Draconis.

The velocity of this star in the line of sight varies rapidly.

Four spectrograms give the following results:—

1899, July	25	+	18 ^{km.}
Aug.	8	—	45
	9	—	12
	29	—	53

β Capricorni.

For this star we have the following observed velocities:—

1898, Aug.	15	—	5 ^{km.}
1899, May	15	—	42.9
	29	—	44.6
	29	—	44.4*
June	8	—	42.4
	14	—	42.4
	26	—	41.1
July	12	—	40.3
	24	—	39.1
Aug.	12	—	37.8
	15	—	38.6†
Sept.	4	—	35.2
	10	—	34.5
	25	—	33.0†
	26	—	33.8

The period remains undetermined, but is evidently long.

α Aurigæ (Capella).

The spectrum of this star is composite. The component whose spectrum is of the solar type furnished the following velocities with reference to the solar system:—

* Measures of the same plate by Mr. WRIGHT. † Measures by Mr. WRIGHT.

1896, Aug. 31	+ 34 ^{km.}
Sept. 16	+ 54
Oct. 3	+ 49
5	+ 44
Nov. 12	+ 4
1897, Feb. 24	+ 3

On the first photograph the spectrum is of essentially normal solar type; on the others it is unmistakably different. There appears to be a second component whose spectrum contains the *H γ* line and the rather prominent iron lines. On the plates of September 16th, October 3d, and October 5th, these lines are shifted toward the violet with reference to the solar-type spectrum; and in the spectra of November 12th and February 24th, they are shifted toward the red.

v Sagittarii.

To the present time we have secured six spectrograms of this star which give the following velocities:—

1896, July 1	— 3 ^{km.}
1899, Aug. 23	— 31
28	— 28
Sept. 5	— 18
12	+ 2
19	+ 10

These measures may be uncertain to the extent of several kilometers, on account of the peculiar and difficult character of the spectrum.

Acknowledgments are due to Mr. WRIGHT for his skillful assistance in the observations.

W. W. CAMPBELL.

November, 1899.

SPECTROSCOPIC BINARY STARS.

In No. 60 of these *Publications*, I gave a short account of the spectroscopic binary stars known to exist before January, 1898, dividing them into three classes—(1) those known by the periodic partial eclipse of the bright star by a relatively dark companion, that is, the *Algol*-type variables; (2) those known by the periodic doubling of the lines in the star's spectrum, like β *Aurigæ*; and (3) those known by the shifting of the spectral lines alternately toward the red and the violet ends of the spectrum, as compared with the corresponding lines in the artificial spectrum of hydrogen or iron. At that time, the stars of